

PA54

# UK Patent Application GB 2 169 377 A

(43) Application published 9 Jul 1986

(21) Application No 8500426

(22) Date of filing 8 Jan 1985

(71) Applicant

James Benedict Cheetham,  
16 Station Road, Mellings, Nr Liverpool L31 1BW

(72) Inventor

James Benedict Cheetham

(74) Agent and/or Address for Service

James Benedict Cheetham,  
16 Station Road, Mellings, Nr Liverpool L31 1BW

(51) INT CL  
B62D 21/15 F16F 9/10

(52) Domestic classification (Edition H):  
F2S 102 411 414 AA  
B7B SES  
U1S 1820 1853 B7B F2S

(56) Documents cited

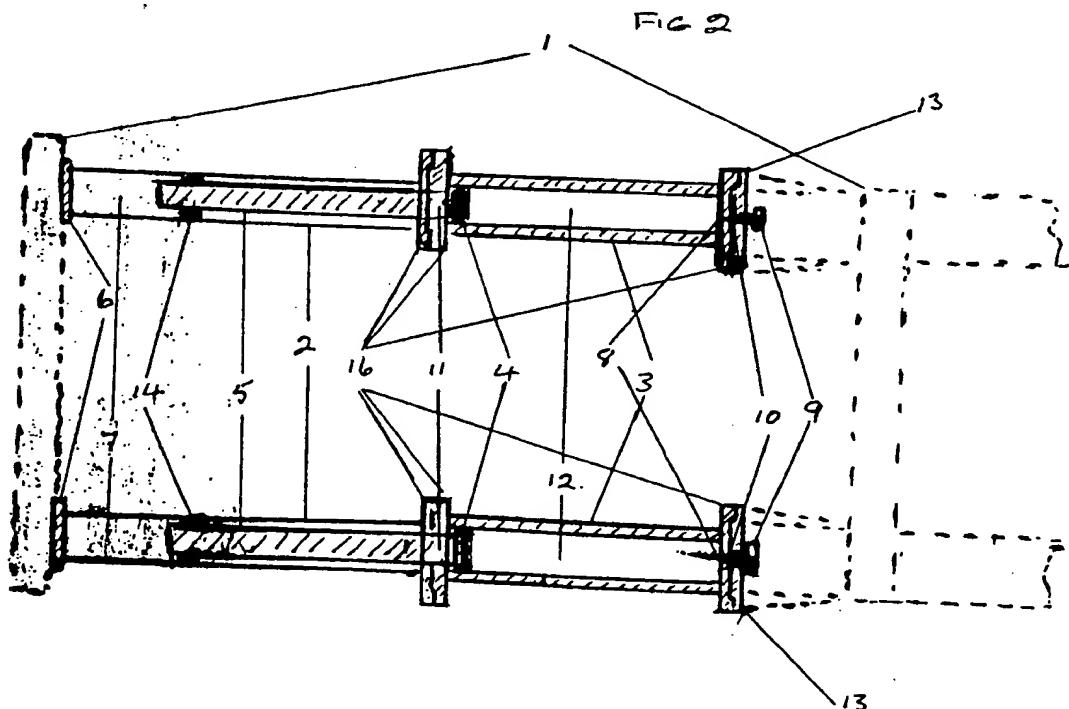
GB A 2036922 GB 1226385 US 3922002  
GB 1384651 US 4257581 US 3860258

(58) Field of search

F2S  
B7B  
Selected US specifications from IPC sub-classes F16F  
B60R B62D

## (54) Violent impact energy absorber

(57) A violent impact energy absorber as fitted to a vehicle subframe or chassis comprises collapsible tubing 6 and hydraulic piston/cylinder units 3 in series. Tubing 6 alone distorts under low velocity collisions and may be replaced, but under high velocity impacts units 3 also contract to take up some of the force. Units 3 can include a throttle 8 and bursting seal 10, and an air lock (15, Fig. 3).

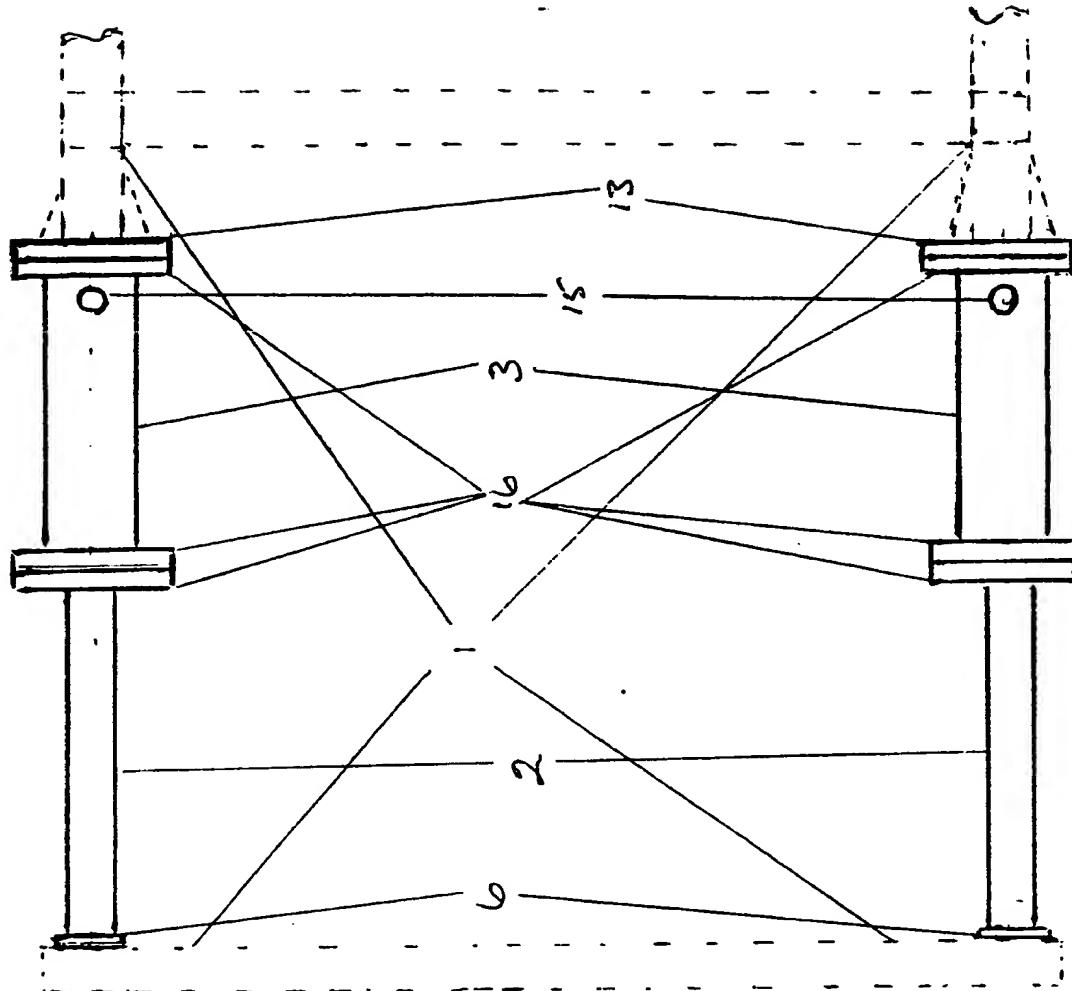


BEST AVAILABLE COPY

GB 2 169 377 A

2169377

FIG 1  
1/3



## SPECIFICATION

### Violent impact energy absorber

5 This invention relates to energy absorbers within the chassis/subframes of any vehicles. Many vehicle manufacturers have designed chassis/subframes which collapse in part during head on collisions, thus reducing the  
 10 chance of death or injury to the occupants or the vehicle due to the energy absorption in the leading collapsed area of the chassis/sub frame.

This invention which is part of the chassis-/  
 15 subframes and can be used for mountings and other fitments, consists of steel tubing in the forward area e.g. square section with hydraulic cylinders and rams following to the rear.

In minor mishaps or low velocity crashes  
 20 the cylinders will not operate and the forward damaged steel tubing can be replaced. In higher velocity head on collisions the comparatively weaker tubing collapses in concertina form, forcing the ram forward into the cylinder.  
 25 which is fitted with a low pressure bursting seals covering a small orifice in the rear flange of the hydraulic cylinders.

As the ram advances the pressure exerted on non combustable liquid contained in the  
 30 cylinders bursts the seal and the liquid goes to atmosphere.

A dome at the top of each hydraulic cylinder contains an air pocket which will tend to reduce the (hydraulic knock) by increasing the  
 35 air pressure in the dome as the liquid is being discharged.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in  
 40 which:-

*Figure 1* shows a plan view of units in position assembled to the chassis/subframe of a vehicle.

*Figure 2* shows a plan view half section  
 45 which illustrates the operation of the units. The forward end 1 is subject to a minor low velocity collision distorting the forward section in the "free area" 7 and may be replaced from the bolted flange (spigoted) 16.

50 In higher velocity collisions the "free area" 7 yields under the extra force in a concertina pattern forcing the hydraulic rams 5 into the cylinders 3 which contains a suitable liquid 12, as the rams 5 proceed, pressure is built up  
 55 inside the cylinders compressing an air lock in domes 15 (to reduce the instant "hammer" effect of the liquid), as the pressure continues to increase the low pressure bursting seal 10 fails allowing the liquid to be forced through  
 60 the aperture/orifice 8 and bored seal retaining plug 9 to the atmosphere, thereby lessening the impact experienced to the occupants of the vehicle:

*Figure 3* shows an elevation half section of  
 65 one unit showing a push pad 6 the "free

area" 7 the hydraulic ram 5 the piston with seals 4 the plastic steady 14. The bolted spigoted flanges 16 the air dome 15 the hydraulic ram seal 11 the low pressure bursting

70 seals 10 the orifice 8 the bored seal retaining plug 9 and the spigoted thrust flange to the chassis/sub frame 13.

### CLAIMS

75 1. A violent impact energy absorber comprising a cylinder flanged at each end, jointed and spigoted for location and rigidity, a piston with seals, a piston rod sealed at the forward flange end, mating transition flanges, a forward lead section with push plate, and incom-

80 bustible liquid.  
 An air pocket dome is situated uppermost at the rear of the cylinder near the rear flange of the cylinder which mates with a thrust transi-

85 sion flange.

The rear cylinder flange has an orifice in the centre matching an orifice in the thrust transition flange which is provided with a low pressure bursting seal and bored retaining plug.

90 The unit is adapted to be situated each side and within a chassis/sub frame of any vehicle or any position according to design.

2. A violent impact energy absorber as claimed in 1 wherein dimensions may vary

95 e.g., diameter of cylinder, diameter of orifice and length of stroke depending on the mass of the vehicle.

3. A violent impact energy absorber as claimed in 1 or 2 is provided with a steady as

100 a support for the piston rod housed in the forward lead section.

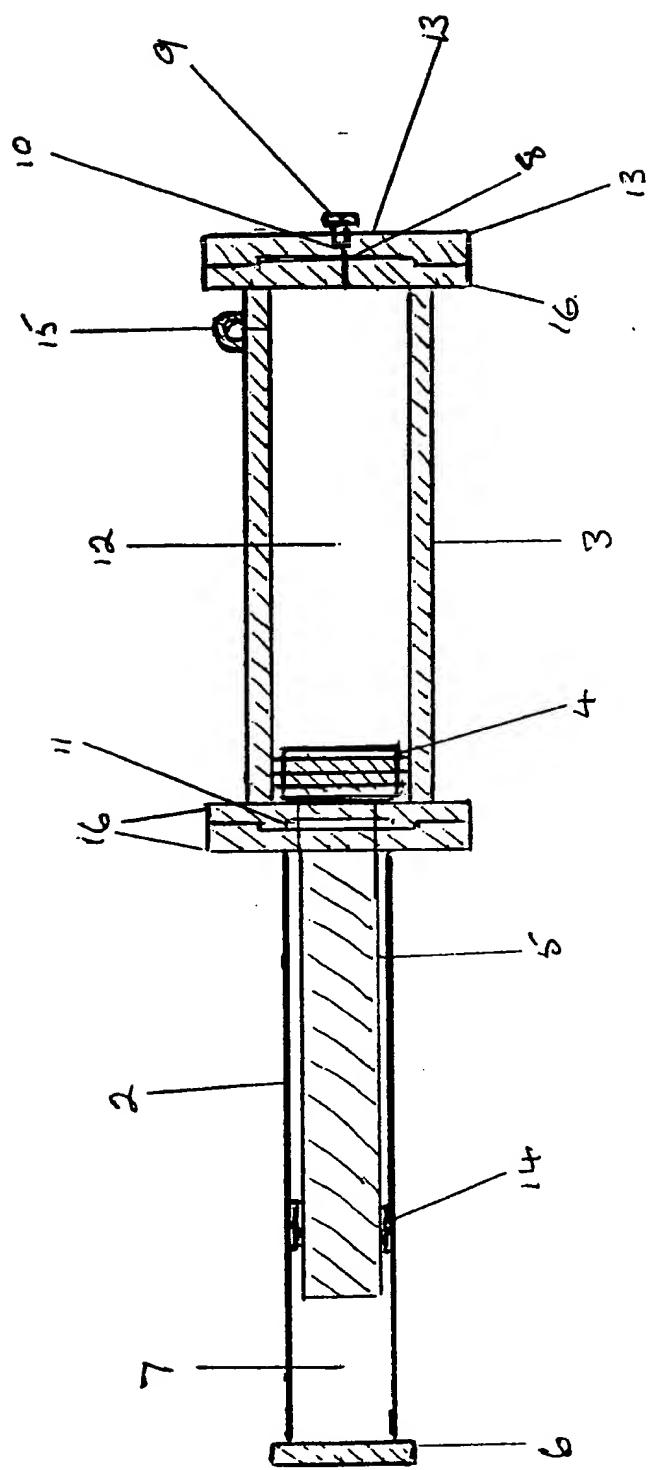
4. A violent impact energy absorber as claimed in claim 2 or claim 3 wherein means are provided for securing and sealing the unit to a chassis/sub frame.

5. A violent impact energy absorber substantially as described herein with reference to Figs. 1-3 of the accompanying drawings.

Printed in the United Kingdom for  
 Her Majesty's Stationery Office, Dd 8818935, 1986, 4235.  
 Published at The Patent Office, 25 Southampton Buildings,  
 London, WC2A 1AY, from which copies may be obtained.

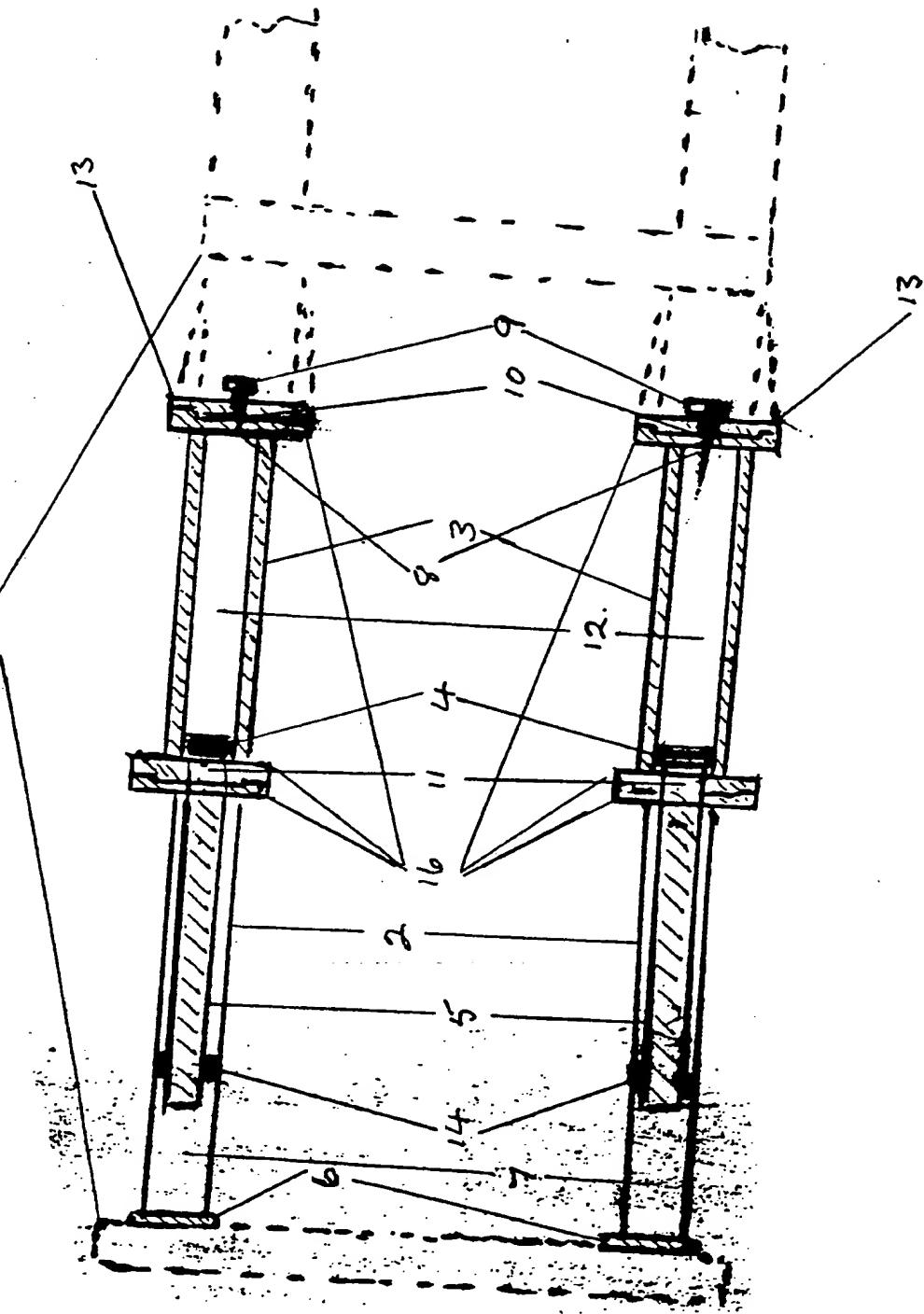
2169377

FIG 3 3/3



2169377

FIG 2 2/3



**This Page Blank (uspto)**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

This Page Blank (uspto)